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INFORMAL LOGIC

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This book is dedicated
to Susannah, Sam, and Jonah

In a republican nation, whose citizens are to be led
by reason and persuasion and not by force,
the art of reasoning becomes of first importance.

—*Thomas Jefferson*

Preface

Although I have been teaching undergraduate courses in logic since 1939, it was only about half a dozen years ago that I first taught a course in the subject now known variously as "informal logic" or "critical thinking." I used two textbooks whose publishers assured me were the most widely used in this fast-growing field. They did not work as well for me as I am sure they did for some other teachers. But they worked well enough to persuade me that informal logic is enormously useful for students to learn and that it is stimulating and enjoyable to teach.

Since then I have managed to collect and develop some teaching materials and strategies that work somewhat better for me and for my students. I doubt very much that there is—or ever could be—a single approach, or organization of instructional materials, that would be absolutely best for every teacher and for every group of students. But in the hope that what seems to work well for me and my students might be useful to other teachers and their students too, I am happy to be able to make these materials available to others who are interested in helping students think more clearly, critically, and competently.

It seems to me that either an informal logic course or the more usual introduction to logic can serve not only as a terminal course in critical thinking but as an adequate preparation for more specialized or advanced courses in logic. In no way should either informal logic or introduction to logic be viewed as either preparation or prerequisite for the other. Hence I have not hesitated to incorporate into this *Informal Logic* textbook materials from the informal parts of my older *Introduction to Logic* textbook.

This book has profited greatly by careful reading and useful suggestions from Professor Richard W. Behling of the University of Wisconsin-Eau Claire; Professor Thompson M. Faller of the University of Portland; my colleague David Nakamura of the University of Hawaii; Professor Perry Weddle of California State University, Sacramento; and Professor R. G. Wengert of the University of Illinois. I wish to acknowledge their help here with warm thanks.

I thank also Mr. Ronald C. Harris of Macmillan for his expertise and helpfulness in seeing this book through the press.

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1 Introduction

1.1 What Is Logic?

Logic is concerned with reasoning. Its concern is to distinguish good reasoning from bad, or better from worse. Logic is both an art and a science. As a science logic investigates, develops, and systematizes principles and methods that can be used to distinguish between correct and incorrect reasoning. The science of logic has its own professional jargon and technical notation, like other advanced sciences such as mathematics, physics, and chemistry. But as an art, logic can be equated with "logical ability" and includes a whole family of related skills that have many applications. Among those applications are problem solving, weighing evidence, marshaling evidence and constructing arguments for or against a disputed proposition, analyzing a problem into components that may usefully be dealt with separately, detecting and exposing mistakes in reasoning (including one's own), and clarifying issues, often through defining or redefining the key terms on which disputes frequently turn. In studying informal logic, our aim is to develop and strengthen these skills.

These logical skills are valuable and important. Each of us is a constant target for those who want to influence our beliefs, our actions, and the way we feel about things. In our free society, others cannot simply demand that we think, act, and feel as they tell us to. They must attempt to persuade us. Often they have their own benefit or advantage in mind rather than ours. So we should not let ourselves be too easily persuaded. We should believe only on the basis of evidence, act only in ways for which we have good grounds for acting, and our feelings or attitudes should be in harmony with our most deeply held commitments and sense of self. In general, we ought to let our beliefs be guided by the careful weighing of argument and evidence. Where a proposed action could have serious consequences, we should have good reason for taking such an action. Here is where logical skills can protect us from being unduly influenced by media commercials, slanted "news" stories, and politicians' promises.

Another benefit of developing our logical skills comes when we try to understand complex situations and to think things through. As the greatest American philosopher, Charles Sanders Peirce, remarked long ago, "The object of reasoning is to find out, from the consideration of what we already know, something else which we do not know."[1] To achieve this object, to extend our knowledge by reasoning, we must reason well rather than poorly. In order to infer correct and useful conclusions from what we already know, we must possess and apply the logical skills that constitute the art of logic. As Peirce went on to remark, "We come to the full possession of our power of drawing inferences, the last of all our faculties; for it is not so much a natural gift as a long and difficult art."[2] Indeed, sometimes in the process of reasoning we find that we are working with less than maximum effectiveness: depending on slogans rather than using our intelligence, avoiding the work of thinking by appealing only to habit, stereotypes, stale maxims, and vague generalities.

Finally, logical skills are valuable because they contribute to both fruitful cooperation and effective leadership. We live in communities with others, and some of our needs and wants can be satisfied only by the effort of many people working together toward common goals. That presupposes agreement on goals and on ways to achieve them. In reaching such agreement, one must try to avoid being persuaded on

[1]Charles Sanders Peirce, "The Fixation of Belief," 1877, reprinted in Irving M. Copi and James A. Gould, *Readings on Logic*, Second Edition (New York: The Macmillan Company, 1972), page 60.

[2]Ibid. page 59.

insufficient grounds by others. Here the recognition of bad reasoning is important. But it is also important to be able to persuade others to agree on what is the best route to the best goal. Careful, constructive, *logical* thinking is not only a basis for productive collaboration, but the hallmark of effective and dependable leadership.

As in developing any other skill, practice is essential. One learns by doing. The problems contained in this book are probably the most important part of it. You will surely strengthen your logical skill by taking the time and making the effort to do the exercises.

1.2 Premisses and Conclusions

To clarify the explanation of logic offered in the preceding section, it will help to set forth and discuss some of the special terms used by logicians in their work. *Inference* is commonly defined as a process in which one proposition is arrived at and affirmed on the basis of one or more other propositions accepted as the starting point of the process. To determine whether an inference is correct, the logician examines those propositions that are the initial and end points of that process and the relationships between them.

Propositions are either true or false, and in this they differ from questions, commands, and exclamations. Only propositions can be either asserted or denied: questions may be asked and commands given and exclamations uttered, but none of them can be affirmed or denied, or judged to be either true or false.

It is customary to distinguish between sentences and the propositions they may be uttered to assert. Two sentences, which are clearly two because they consist of different words differently arranged, may in the same context have the same meaning and be uttered to assert the same proposition. For example,

John loves Mary.
Mary is loved by John.

are two different sentences, for the first contains three words, whereas the second contains five; the first begins with the word "John," whereas the second begins with the word "Mary," and so on. Yet the two sentences have exactly the same meaning. We use the term "proposition" to refer to what such sentences as these are typically uttered to assert.

The difference between sentences and propositions is brought out by remarking that a sentence is always a sentence of a particular language, the language in which it is uttered, whereas propositions are not peculiar to any language. The four sentences

It is raining.
Está lloviendo.
Il pleut.
Es regnet.

are certainly different, for they are in different languages: English, Spanish, French, and German. Yet they have but a single meaning, and in appropriate contexts may be uttered to assert the proposition of which each of them is a different formulation. In different contexts exactly the same sentence can be uttered to make very different *statements*. For example, the sentence

The present president of the United States is a former senator.

could have been uttered in 1973 to make a (true) statement about Richard Nixon, but might have been uttered in 1983 to make a (false) statement about Ronald Reagan. In those different temporal contexts, the sentence in question would be uttered to assert different propositions or to make different statements. The terms "proposition" and "statement" are not exact synonyms, but in the context of logical investigation they are used in much the same sense. Some writers on logic prefer "statement" to "proposition," although the latter has been more common in the history of logic. In this book both terms will be used.

Corresponding to every possible inference is an *argument*, and it is with these arguments that logic is chiefly concerned. An argument, in the logician's sense, is any group of propositions of which one is claimed to follow from the others, which are regarded as providing support or grounds for the truth of that one. Of course the word "argument" is often used in other senses, but in logic it has the special sense explained. An argument is not a mere collection of propositions, but has a structure. In describing this structure, the terms "premiss" and "conclusion" are usually employed. The *conclusion* of an argument is that proposition which is affirmed on the basis of the other propositions of the argument, and these other propositions, which are affirmed (or assumed) as providing support or reasons for accepting the conclusion, are the *premisses* of that argument.

1.2 Premisses and conclusions

The simplest kind of argument consists of just one premiss and a conclusion that is claimed to follow from it, or to be implied by it. An example in which each is stated in a separate sentence is the following:

> The investigation of supernatural phenomena lies outside the realm of science. Therefore, science can neither prove nor disprove the existence of God.[3]

Here the premiss is stated first and the conclusion second. But the order in which they are stated is not significant from the point of view of logic. An argument in which the conclusion is stated in the first sentence and the premiss in the second is

> Moreover, cutting Social Security will not improve the deficit problem. As Martin Feldstein, chairman of the Council of Economic Advisers, has noted, Social Security is funded by separate payroll taxes and contributes not a cent to the deficit.[4]

In some arguments the premiss and conclusion are stated in the same sentence. Following is a one-sentence argument whose premiss precedes its conclusion:

> The solar system is much younger than the universe (only 4.5 billion years compared with 10 to 15 billion years), and so it must have formed from older matter that had a previous history.[5]

Sometimes the conclusion precedes the premiss in a one-sentence argument, as in the following example:

> The budget deficit will not be brought under control because to do so would require our elected leaders in Washington to do the unthinkable—act courageously and responsibly.[6]

When reasons are offered in an effort to persuade us to perform a specified action, we are presented with what is in effect an argument even though the "conclusion" may be expressed as an imperative or command. Consider, for example, the following two passages:

> Wisdom is the principal thing; therefore get wisdom. . . .[7]

and

[3]James A. Hopson, Letter to the Editors, *The New Republic*, September 12, 1983, page 4.

[4]Daniel Patrick Moynihan, "Reagan's Bankrupt Budget," *The New Republic*, December 31, 1983, page 20.

[5]Roy S. Lewis and Edward Anders, "Interstellar Matter in Meteorites," *Scientific American*, Vol. 249, No. 2, August 1983, page 66.

[6]Bruce Crutcher, Letter to the Editor, *U.S. News & World Report*, December 19, 1983, page 4.

[7]Proverbs 4:7

> Neither a borrower nor a lender be;
> For loan oft loses both itself and friend.[8]

Here too the command may either precede or follow the reason (or reasons) offered to persuade the hearer (or reader) to do what is commanded. For the sake of uniformity and simplicity, it is useful to regard commands, in these contexts, as no different from propositions in which hearers (or readers) are told that they should, or ought to, act in the manner specified in the command. Exactly what difference, if any, there is between a command to do something and a statement that it should or ought to be done is a difficult problem that need not be explored here. By ignoring that difference (if there really is one), we are able to regard both kinds of arguments as structured groups of propositions.

Some arguments offer several premisses in support of their conclusions. On occasion the premisses are enumerated as first, second, third—or as (a), (b), (c) in the following argument, in which the statement of the conclusion precedes the statements of the premisses:

> To say that statements about consciousness are statements about brain processes is manifestly false. This is shown (a) by the fact that you can describe your sensations and mental imagery without knowing anything about your brain processes or even that such things exist, (b) by the fact that statements about one's consciousness and statements about one's brain processes are verified in entirely different ways, and (c) by the fact that there is nothing self-contradictory about the statement "X has a pain but there is nothing going on in his brain."[9]

In the following argument the conclusion is stated last, preceded by three premisses:

> Since happiness consists in peace of mind, and since durable peace of mind depends on the confidence we have in the future, and since that confidence is based on the science we should have of the nature of God and the soul, it follows that science is necessary for true happiness.[10]

Counting the premisses of an argument is not terribly important at this stage of our study, but it will gain importance as we proceed to analyze and diagram more complicated arguments later on. To list the premisses of the preceding arguments, we cannot appeal simply to the

[8]William Shakespeare, *Hamlet*, I, iii.

[9]U. T. Place, "Is Consciousness a Brain Process?" *The British Journal of Psychology*, February 1956.

[10]Gottfried Leibniz, *Preface to the General Science.*

number of *sentences* in which they are written. That they are all in a single sentence should not be allowed to disguise their multiplicity.

It should be noted that "premiss" and "conclusion" are relative terms: one and the same proposition can be a premiss in one argument and a conclusion in another. Consider, for example, the argument:

> Now human law is framed for the multitude of human beings. The majority of human beings are not perfect in virtue. Therefore human laws do not forbid all vices. . . .[11]

Here the proposition *human laws do not forbid all vices* is the conclusion, and the two propositions preceding it are premisses. But the given argument's conclusion is a premiss in the following (different) argument:

> . . . vicious acts are contrary to acts of virtue. But human law does not prohibit all vices, as was stated. Therefore neither does it prescribe all acts of virtue.[12]

No proposition by itself, in isolation, is either a premiss or a conclusion. It is a premiss only where it occurs as an assumption in an argument. It is a conclusion only where it occurs in an argument in which it is claimed to follow from propositions assumed in that argument. Thus "premiss" and "conclusion" are relative terms, like "employer" and "employee." A person alone is neither employer nor employee, but may be either in different contexts: employer to one's gardener, employee of the firm for which one works.

The preceding arguments either have their premisses stated first and their conclusions last, or their conclusions are stated first, followed by their premisses. But the conclusion of an argument need not be stated either at its end or at its beginning. It can be, and often is, sandwiched in between different premisses offered in its support. This arrangement is illustrated in the following:

> Iran's chargé d'affaires in Beirut, Mehdi Amer Rajai, said, "If America enters the war, all hostages in Iran will be killed. Therefore, America will not do any such thing, especially now that the American elections are close and the death of the hostages will not be to [President] Carter's advantage. . . ."[13]

Here the conclusion that *America will not enter the war* is asserted on the basis of the propositions that precede and follow it.

[11]Thomas Aquinas, *Summa Theologica*, I–II, Question 96, Article 2.
[12]Ibid., Article 3.
[13]Alvin B. Webb, United Press International report, *Honolulu Advertiser*, October 2, 1980, page 4.